

APPENDIX M  
TRANSPORTATION FUEL CALCULATIONS

Construction Fuel Consumption

Phase	Equipment	Quantity	Hours Each Day	Total Number of Days Worked	Horse Power	Load Factor	Fuel Consumption Rate (Gallons per Hour)	Duration (Total Hours)	Total Fuel Consumption (Gallons)
<b>Phase I</b>									
Demolition	Concrete/Industrial Saws	2	8	55	81	0.73	2.9565	880	2601.72
	Cranes	1	8	55	231	0.29	3.3495	440	1473.78
	Excavators	2	8	55	158	0.38	3.002	880	2641.76
	Rubber Tired Dozers	1	8	55	247	0.4	3.952	440	1738.88
	Tractors/Loaders/Backhoes	2	8	55	97	0.37	1.7945	880	1579.16
Pre-Excavation and Landmark Relocation	Cranes	1	6	131	231	0.29	3.3495	786	2632.707
	Forklifts	2	6	131	89	0.2	0.89	1572	1399.08
	Tractors/Loaders/Backhoes	2	6	131	97	0.37	1.7945	1572	2820.954
Grading	Air Compressors	2	8	84	78	0.48	1.872	1344	2515.968
	Bore/Drill Rigs	1	8	84	221	0.5	5.525	672	3712.8
	Cement and Mortar Mixers	2	8	84	9	0.56	0.252	1344	338.688
	Cranes	1	8	84	231	0.29	3.3495	672	2250.864
	Excavators	2	8	84	158	0.38	3.002	1344	4034.688
	Forklifts	1	8	84	89	0.2	0.89	672	598.08
	Generator Sets	1	8	84	84	0.74	3.108	672	2088.576
	Rubber Tired Dozers	1	6	84	247	0.4	4.94	504	2489.76
	Tractors/Loaders/Backhoes	3	7	84	97	0.37	1.7945	1764	3165.498
	Welders	2	8	84	46	0.45	1.035	1344	1391.04
Boring and Trenching for Landmark Sites	Bore/Drill Rigs	1	8	12	221	0.5	5.525	96	530.4
	Cement and Mortar Mixers	2	8	12	9	0.56	0.252	192	48.384
	Excavators	2	8	12	158	0.38	3.002	192	576.384
	Tractors/Loaders/Backhoes	2	8	12	97	0.37	1.7945	192	344.544
	Trenchers	2	8	12	78	0.5	1.95	192	374.4
Permanent Relocation of Landmarks	Cement and Mortar Mixers	2	8	12	9	0.56	0.252	192	48.384
	Cranes	1	6	12	231	0.29	3.3495	72	241.164
	Forklifts	2	6	12	89	0.2	0.89	144	128.16
	Tractors/Loaders/Backhoes	2	6	12	97	0.37	1.7945	144	258.408
Building Construction	Air Compressors	2	6	595	78	0.48	1.872	7140	13366.08
	Cement and Mortar Mixers	2	8	595	9	0.56	0.252	9520	2399.04
	Cranes	2	6	595	231	0.29	3.3495	7140	23915.43
	Forklifts	1	6	595	89	0.2	0.89	3570	3177.3
	Generator Sets	1	8	595	84	0.74	3.108	4760	14794.08
	Tractors/Loaders/Backhoes	2	6	595	97	0.37	1.7945	7140	12812.73
	Welders	2	8	595	46	0.45	1.035	9520	9853.2
Paving	Cement and Mortar Mixers	2	6	35	9	0.56	0.252	420	105.84
	Pavers	2	6	35	130	0.42	2.73	420	1146.6
	Paving Equipment	2	8	35	132	0.36	2.376	560	1330.56
	Rollers	2	7	35	80	0.38	1.52	490	744.8
Architectural Coating	Air Compressors	2	6	24	78	0.48	1.872	288	539.136

Fuel Consumption by Phase (Construction Equipment)

Phase	Fuel Consumption (Gallons)
<b>Total</b>	<b>126,209.0</b>

**Notes:** Refer to Appendix X for construction equipment quantities, horse power, load factors, and hours of use per phase. Fuel consumption factor for diesel engine is assumed to be 0.04 gallons per horsepower per hour (gal/hp/hr).

Fuel Consumption by Phase (Construction Vehicle Trips)

Phase	Fuel Consumption (Gallons)
<b>Total</b>	<b>163,381.0</b>

Phase	Category	Vehicle Type	Number of Trips	Trip Length	Number of Days	VMT	Total Trips	Fuel Consumption	
								Rate (Miles Per Gallon)	Total Fuel Consumption
<b>Phase I</b>									
Demolition	Worker Trips	Light-duty Vehicle	160	14.7	55	129360	8800	21	6160.0
	Vendor Trips	Heavy-duty Vehicle	0	6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle	320	20		6400	320	6.2	1032.3
Pre-Excavation and Landmark Relocation	Worker Trips	Light-duty Vehicle	160	14.7	131	308112	20960	21	14672.0
	Vendor Trips	Heavy-duty Vehicle		6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle		20		0	0	6.2	0.0
Grading	Worker Trips	Light-duty Vehicle	160	14.7	84	197568	13440	21	9408.0
	Vendor Trips	Heavy-duty Vehicle		6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle	12800	20		256000	12800	6.2	41290.3
Boring and Trenching for Landmark Sites	Worker Trips	Light-duty Vehicle	160	14.7	12	28224	1920	21	1344.0
	Vendor Trips	Heavy-duty Vehicle	0	6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle	0	20		0	0	6.2	0.0
Permanent Relocation of Landmarks	Worker Trips	Light-duty Vehicle	160	14.7	12	28224	1920	21	1344.0
	Vendor Trips	Heavy-duty Vehicle	0	6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle	0	20		0	0	6.2	0.0
Building Construction	Worker Trips	Light-duty Vehicle	160	14.7	595	1399440	95200	21	66640.0
	Vendor Trips	Heavy-duty Vehicle	29	6.9	595	119059.5	17255	8	14882.4
	Haul Trips	Heavy-Heavy-duty Vehicle	0	20		0	0	6.2	0.0
Paving	Worker Trips	Light-duty Vehicle	160	14.7	35	82320	5600	21	3920.0
	Vendor Trips	Heavy-duty Vehicle	0	6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle	0	20		0	0	6.2	0.0
Architectural Coating	Worker Trips	Light-duty Vehicle	160	14.7	24	56448	3840	21	2688.0
	Vendor Trips	Heavy-duty Vehicle	0	6.9		0	0	8	0.0
	Haul Trips	Heavy-Heavy-duty Vehicle	0	20		0	0	6.2	0.0

Light-duty Vehicle fuel efficiency based on average light-duty fuel efficiency from 1990-2015. Source: <https://www.bts.gov/content/average-fuel-efficiency-us-light-duty-vehicles>

Heavy-duty Vehicle fuel efficiency based on average fuel efficiency for a 22'/26' flat bed haul truck. Source: <https://www.pensketruckrental.com/fuelcalc/JSP/FuelCalc.jsp>

Heavy-Heavy-duty Vehicle fuel efficiency based on typical highway hauling fuel efficiency rate of 6.2 mpg. Source: <https://www.equipmentworld.com/owning-and-operating-costs-8/>

**Notes:**

Refer to Appendix X for construction vehicle trips, lengths, and VMT per phase

## Operation Fuel Consumption

	Percent of Trips	Daily Vehicle Miles Traveled	Average Fuel Economy (mpg)	Total Daily Fuel Consumption (Gallons)
<b>Existing+Project Total</b>	<b>100</b>	25,933 -		1,451.91
Passenger Cars	54.5%	14,133	23.3	606.59
Light/Medium-duty Vehicles	37.0%	9,595	17.1	561.12
Heavy-duty Vehicles	8.0%	2,075	7.3	284.20
Motorcycles	0.5%	130	43.4	2.99